

Instantly Available technology - Q&A for the PC 99 System Design Guide

Q1. How do Instantly Available and OnNow® fit together?

A1. OnNow® is a broad system architecture for power aware operation of the PC. It is fully consistent with the Instantly Available PC initiative. Instantly Available is a hardware architecture for efficient power management on the desktop aimed at delivering deep (<5W) sleep states, quiet operation when sleeping, and resume times of ~5 seconds. OnNow and Instantly Available share some common elements, including ACPI, bus power management (PCI, USB, 1394) and device class power management specifications.

Q2. What are the key components required to build an Instantly Available PC?

A2. Instantly Available PCs include the following elements: ACPI BIOS, ACPI operating system, ACPI chipset and instrumented devices, PCI slots (if included) fully compliant with the PCI-PM 1.1 specification (i.e. supplying 3.3Vaux to every slot), and dual mode power delivery as defined in the Instantly Available Implementation Guide. These components enable robust implementation of ACPI's S3 Suspend to RAM state, which lies at the core of Instantly Available functionality.

Q3. Is Instantly Available required by the PC 99 System Design Guide?

A3. The PC 99 System Design Guide (section 3.2.2) requires that manufacturers support the S5 state, plus at least one state from S1, S2 and S3. The S3 sleep state, central to the Instantly Available PC, is strongly recommended, and is likely to become a requirement in future design guides. Section 3.3 requires that all systems, except for mobile PCs, support the OnNow and Instantly Available initiatives. To this end, the system power supply (as stated in section 3.3.5) must provide a "standby" power for system wake-up events. This must be a minimum of 720mA at 3.3V. Sections 3.27, 9.6, 9.17 and 9.18 also require that, if present, the PCI bus must comply with PCI Bus specification 2.1 or later, the PCI Bus Power Management Interface Specification (PCI-PM), Revision 1.1, or later, and that the system provides both 3.3V and 3.3Vaux power to all PCI connectors. If a Cardbus controller is present in the system, it and all installed cards must also implement PCI power management (Section 12.19). Every major subsystem of the PC is required to support the D3 power state required for support of S3 system state (Audio : Section 17.29, Graphics : Section 14.54, Modems : Section 9.20 and 19.38, Network Adapters : Section 9.20 and 20.56). So, while S3 is not specifically required by PC 99, all of the major elements needed to build a

machine supporting S3 (namely generation of 3.3Vaux, and D3cold device support) are required.

Q4. What ACPI implementation is required by the PC 99 System Design Guide? (Is S3 required or not?)

A4. Support for S3 is not required in the PC 99 System Design Guide. It is strongly recommended, however, and is likely to become a requirement in future design guides. However, many of the capabilities needed to implement a PC that sleep using Suspend to RAM (3.3Vaux, 720mA standby supply, PCI-Power Management, devices that support D3cold) are already required in the specification, and incremental implementation effort to achieve S3 is therefore minimal.

Q5. What's the connection between ACPI and Instantly Available?

A5. Instantly Available is based upon ACPI's S3 state, which is a suspend to RAM configuration.

Q6. Isn't Instantly Available just suspend to RAM?

A6. No. Implementing Suspend to RAM by itself does not give you the full Instantly Available feature set. The key feature of an Instantly Available PC is the ability to wake up on an event. That event could be a phone ring, a network access or some other kind of external stimulus. To do this, a trickle current needs to be supplied to those wakeup devices. They could be hosted on the PCI, USB or other buses, and these in turn need to be powered. The Instantly Available PC requirements and recommendations guide includes a suggested method for implementing the supply circuitry required to deliver this power to wakeup devices.

Q7. Is Instantly Available required for mobile?

A7. The PC 99 System Design Guide does not require that the power supply recommendations (720mA "standby" current) are implemented for mobile PCs. However, it is expected that many mobile designs will include support for Suspend to RAM and wakeup devices, and so could be classified as Instantly Available PCs.

Q8. The PC 99 System Design Guide requires that I implement PCI-PM, 3.3Vaux, deliver 720mA standby from the power supply and have all my devices support D3cold. What's the additional requirement to become Instantly Available?

A8. The only additional requirement is support for ACPI's S3 sleep state (suspend to RAM). On SDRAM implementations, the 3.3Vaux signal already

generated for the PCI slots can also be used to power memory. The key requirement therefore is that the motherboard is designed as a split plane, and that the chipset is able to handle suspend to RAM capability. For designs using main memory technologies running off a voltage other than 3.3V (for example Direct RDRAM), the 3.3Vaux signal will need to be regulated to the appropriate voltage level.

Q9. The PC 99 System Design Guide recommends that systems support a sleep state that reduces power consumption in accordance with the EPA's ENERGY STAR® guidelines. What does that mean?

A9. The US Environmental Protection Agency (EPA) runs a number of programs aimed at reducing energy consumption of electrical devices, including PCs. At the time of writing this program requires that the PC platform is able to enter a sleep state with power consumption (not including the monitor) of no more than 30 watts. In future, the Energy Star guidelines will be extended along two vectors. First, systems will be required to wake up on an external event, such as a phone ring, or a network access. And second, the sleep state power level for PCs will be reduced to 15W. For further information, visit the EPA website at <http://www.epa.gov/appdstar/esoe/techinfo.html>

Q10. What wakeup events are required in PC 99 System Design Guide?

A10. The PC 99 System Design Guide requires systems to be able to wake up from the following events : Network event (Section 20.56), Incoming ring on modems hosted on PCI, Cardbus or USB (Section 19.39), Wireless input devices hosted via an IR or RF connection (Section 13.51). Wake up on USB is required from either the S1 or S2 state, and is recommended from the S3 state (Sections 3.2.4, 7.7 and 19.39)

Q11. Why would I need to implement the S3 state rather than the S1 state?

A11. There are a number of reasons why a manufacturer may choose to implement their sleep state around S3, rather than S1. Firstly, the PC 99 System Design Guide requires the system and devices to appear as off in the sleep state (Sections 3.3.1 and 3.7). In order for systems to be perceived as off, power consumption needs to be minimized such that fans can either be switched off, or spun very slowly. In many cases, implementing S3 may be the easiest or the only way to fit the thermal envelope determined by chassis airflow characteristics. An S3 implementation is also configuration independent. Adding a card or other internal peripheral to the system will either marginally increase sleep state power consumption, or not increase it at all, allowing fans to remain off during sleep. In contrast, an S1 implementation is more configuration dependent; adding new cards and peripherals to the system can substantially increase sleep state power consumption, potentially forcing increased system cooling and consequent fan operation and noise. In addition, the greatly reduced

power consumption reached in the S3 sleep state may be required to meet future global regulatory requirements expected to be introduced during the lifetime of the PC 99 System Design Guide document.